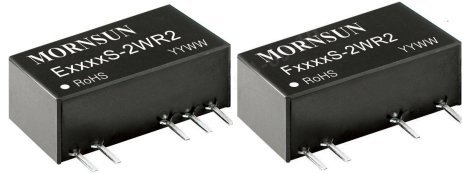


2W isolated DC-DC converter  
Fixed input voltage, unregulated dual/single output



CE Patent Protected RoHS



### FEATURES

- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 86%
- High power density
- Miniature SIP package
- I/O isolation test voltage 3k VDC
- No extra components required
- Industry standard pin-out
- EN62368 approved
- Meets EN62368

E\_S-2WR2 & F\_S-2WR2 series are specially designed for applications where an (two) isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

### Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF)* Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
--	E0503S-2WR2	5 (4.5-5.5)	±3.3	±303/±30	68/72	100
CE	E0505S-2WR2		±5	±200/±20	76/80	
	E0509S-2WR2		±9	±111/±11	80/84	
	E0512S-2WR2		±12	±83/±8	79/83	
	E0515S-2WR2		±15	±67/±7	78/82	
	E0524S-2WR2		±24	±42/±4	80/84	
--	F0503S-2WR2		3.3	606/60	75/79	220
CE	F0505S-2WR2	5	400/40	78/82		
	F0509S-2WR2	9	222/22	78/82		
	F0512S-2WR2	12	167/17	78/82		
	F0515S-2WR2	15	133/13	79/83		
	F0524S-2WR2	24	83/8	80/84		
--	E1203S-2WR2	12 (10.8-13.2)	±3.3	±303/±30	71/75	100
CE	E1205S-2WR2		±5	±200/±20	76/80	
	E1209S-2WR2		±9	±111/±11	78/82	
	E1212S-2WR2		±12	±83/±8	80/84	
	E1215S-2WR2		±15	±67/±7	80/84	
	F1205S-2WR2		5	400/40	78/82	220
	F1209S-2WR2		9	222/22	77/81	
	F1212S-2WR2		12	167/17	80/84	
	F1215S-2WR2		15	133/13	81/85	
	F1224S-2WR2		24	83/8	82/86	
	--		E1515S-2WR2	15 (13.5-16.5)	±15	
CE	F1505S-2WR2	5	400/40		74/78	220
	F1509S-2WR2	9	222/22		75/79	
	F1512S-2WR2	12	167/17		75/79	
CE	E2405S-2WR2	24	±5	±200/±20	76/80	100
	E2409S-2WR2		±9	±111/±11	80/84	
	E2412S-2WR2		±12	±83/±8	80/84	
	E2415S-2WR2		±15	±67/±7	80/84	
	F2405S-2WR2		5	400/40	76/80	220

	F2409S-2WR2	(21.6-26.4)	9	222/22	82/86
	F2412S-2WR2		12	167/17	80/84
	F2415S-2WR2		15	133/13	82/86
--	F2418S-2WR2		18	111/11	82/86
CE	F2424S-2WR2		24	83/8	82/86

Note: \* The specified maximum capacitive load for positive and negative output is identical.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	5V input	--	506/35	--/60	mA
	12V input	--	208/20	--/50	
	15V input	--	159/15	--/35	
	24V input	--	104/10	--/30	
Surge Voltage (1sec. max.)	5V input	-0.7	--	9	VDC
	12V input	-0.7	--	18	
	15V input	-0.7	--	21	
	24V input	-0.7	--	30	
Reflected Ripple Current		--	15	--	mA
Input Filter		Capacitance filter			
Hot Plug		Unavailable			

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy		See output regulation curve (Fig. 1)				
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	±1.5	--
		5/9/12/15/18/24VDC output	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC output	--	18	--	%
		5VDC output	--	12	--	
		9VDC output	--	9	--	
		12VDC output	--	8	--	
		15/18VDC output	--	7	--	
24VDC output	--	6	--			
Ripple & Noise*	20MHz bandwidth	--	75	200	mVp-p	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Short Circuit Protection**	E24xxS-2WR2/F24xxS-2WR2 E12xxS-2WR2/F12xxS-2WR2 E15xxS-2WR2/F15xxS-2WR2 E0524S-2WR2/F0524S-2WR2	--	--	1	s	
	Others	Continuous, self-recovery				

Note: \* The "parallel cable" method is used for Ripple and noise test, please refer to DC-DC Converter Application Notes for specific information;

\*\* At the end of the short circuit duration, the supply voltage must be disconnected from following models: E24xxS-2WR2/F24xxS-2WR2/  
E12xxS-2WR2/F12xxS-2WR2/ E15xxS-2WR2/F15xxS-2WR2 series, and E0524S-2WR2/F0524S-2WR2.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Isolation Voltage	Input-output, Electric strength test for 1 minute with a leakage current of 1mA max.	3000	--	--	VDC	
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ	
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	5/12/15VDC input	--	20	--	pF
		24VDC input	--	50	--	
Operating Temperature	Derating when operating temperature up to 85°C (see Fig. 2)	-40	--	105	°C	
Storage Temperature		-55	--	125	°C	

Case Temperature Rise	Ta=25°C	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	100	--	kHz
MTBF	MIL-HDBK-217F @ 25°C	3500	--	--	k hours

**Mechanical Specifications**

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	19.65 x 7.05 x 10.16 mm
Weight	2.4g (Typ.)
Cooling Method	Free air convection

**Electromagnetic Compatibility (EMC)**

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032	CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	E_S-2WR2	IEC/EN61000-4-2 Contact ±6kV performance Criteria B
		F_S-2WR2	IEC/EN61000-4-2 Contact ±8kV performance Criteria B

**Typical Performance Curves**

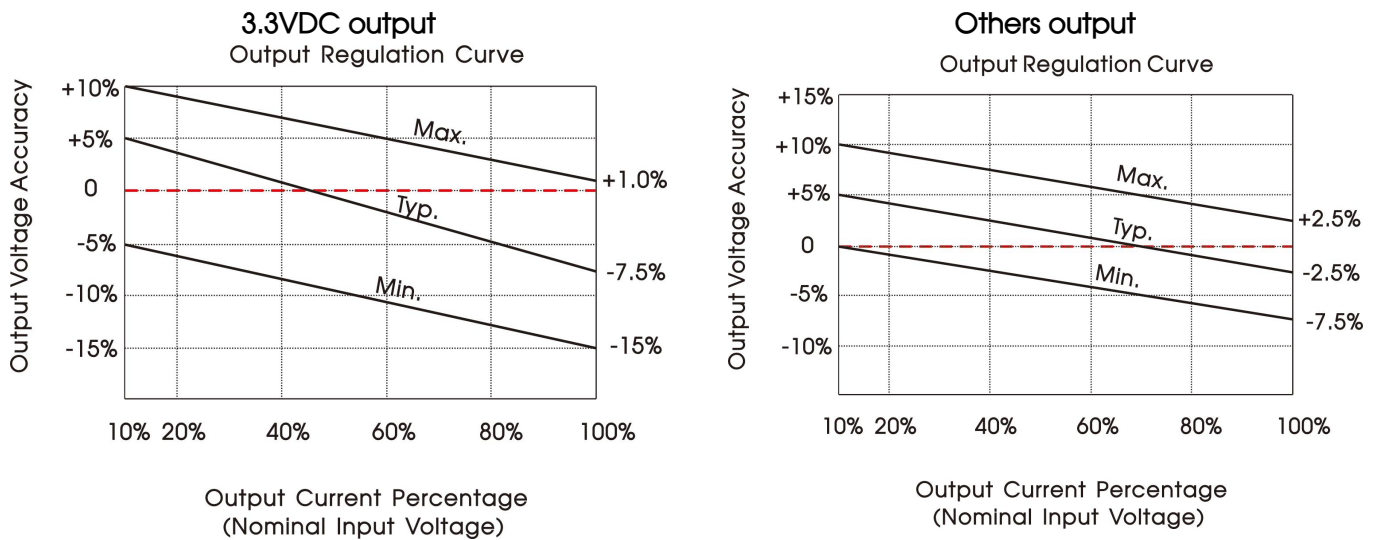


Fig. 1

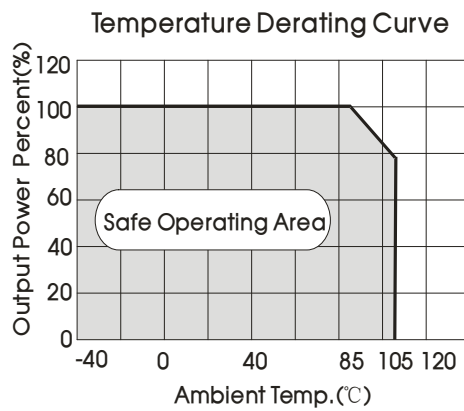
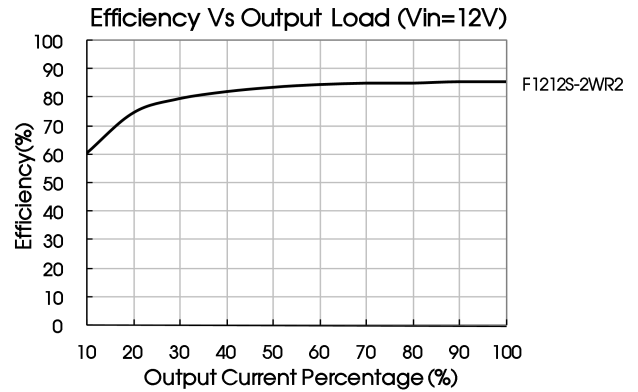
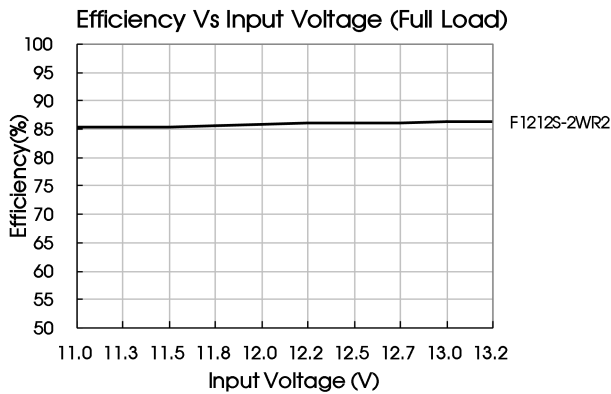
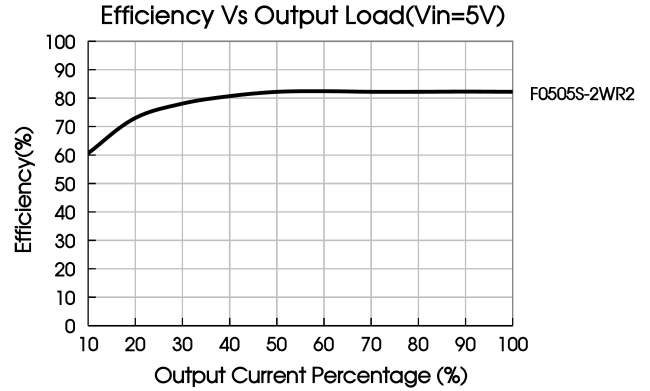
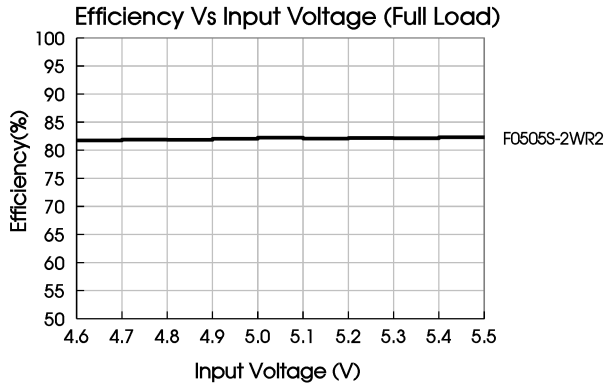


Fig. 2



## Design Reference

### 1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

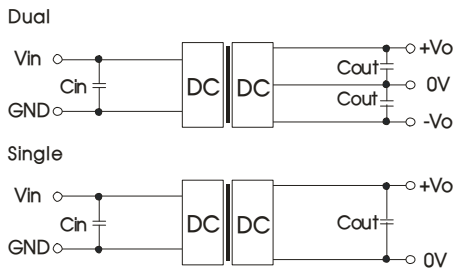


Fig.3

Table 1: Recommended input and output capacitor values

Vin	Cin	Single output	Cout	Dual output	Cout
5 VDC	4.7μF/16V	3.3/5 VDC	10μF/16V	±3.3/±5 VDC	4.7μF/16V
12/15 VDC	2.2μF/25V	9/12 VDC	2.2μF/25V	±9/±12 VDC	1μF/25V
24 VDC	1μF/50V	15/18/24 VDC	1μF/50V	±15/±24 VDC	0.47μF/50V

Note: The capacitor value of the positive and the negative output is identical.

### 2. EMC (CLASS B) compliance circuit

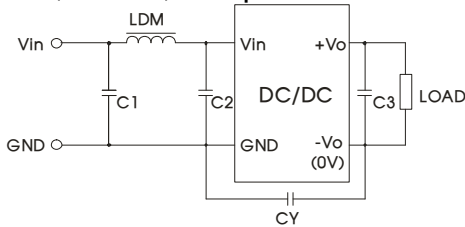


Fig. 4

Input voltage		5/12/15VDC	24VDC
EMI	C1/C2	4.7μF/50V	
	CY	--	1nF/3kV
	C3	Refer to the Cout in Fig.3	
	LDM	6.8μH	

Note: For 24V input models, use a Y-capacitor CY of 1nF/3kV.

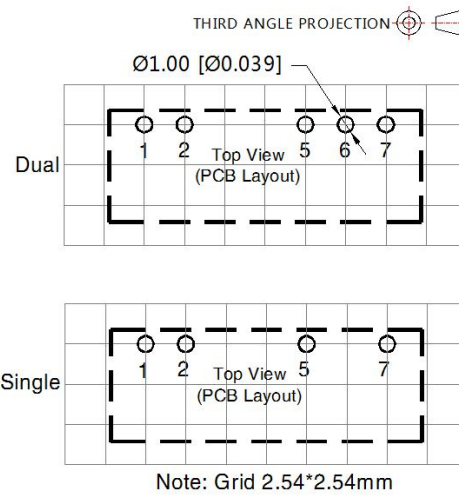
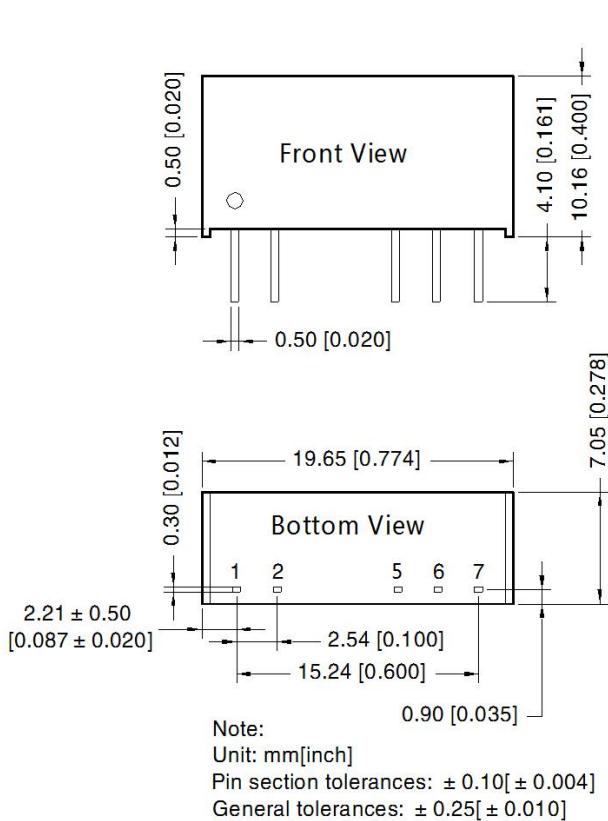
### 3. Minimum Output Load Requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

### 4. For additional information, please refer to the DC-DC converter application notes on

[www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

- Note:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200001;
  - If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
  - The maximum capacitive load offered were tested at input voltage range and full load;
  - Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
  - All index testing methods in this datasheet are based on our corporate company standards;
  - We can provide product customization service, please contact our technicians directly for specific information;
  - Products are related to laws and regulations: see "Features" and "EMC";
  - Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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